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Percutaneous Retrograde Left Ventricular Assist Support for Patients With Aortic Stenosis and Left Ventricular Dysfunction

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Background: In preparation for transcatheter aortic valve implantation, an increasing number of high-risk patients with severe AS and left ventricular dysfunction are currently considered for percutaneous coronary interventions (PCI) and balloon aortic valvuloplasty (BAV). Hemodynamic support may be required in some patients.
Methods: To evaluate feasibility and technical outcomes in patients with aortic stenosis (AS) who have undergone high-risk procedures with continuous flow left ventricular (LV) assist hemodynamic support, with the Impella 2.5 system (Abiomed Inc, Danvers, Massachusetts).
Results: Over a 9-month period, 16 patients with AS underwent insertion of Impella prior to high-risk PCI (n=3), BAV with subsequent PCI (n=5), BAV alone (n=5), or during cardiac arrest immediately following BAV (n=3). The median Society of Thoracic Surgeons (STS) predicted mortality risk was 13% (range 7.3% to 20.9%). Impella was inserted successfully in all patients attempted. Retrograde advancement of two catheters across the aortic valve (for concomitant BAV in 10 patients) was technically feasible. Retrograde continuous flow LV assist produced a reduction in LV end-diastolic pressure and an increase in arterial pressure. Periprocedural vascular complications occurred in 3 patients, with no periprocedural deaths. Mortality at 30 days was 18.8%.
Conclusion: Our data suggests that continuous flow retrograde LV assist with Impella 2.5 is technically feasible in patients with severe AS and left ventricular dysfunction, with favorable hemodynamics to support high risk interventions.

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Predictive value of EuroSCORE derived parameters for the development of right ventricular failure after cardiac surgery

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Background: Postcardiotomy right ventricular (RV) failure is a well-known clinical phenomenon, which is associated with an adverse prognosis. Nevertheless, limited data are available on its predictors. The EuroSCORE is an established risk-prediction model for mortality and in-hospital complications after cardiac surgery. The purpose of our study was to investigate the predictive value of EuroSCORE-derived parameters for the development of postcardiotomy RV failure. Although RV failure remains a therapeutic challenge, a new percutaneous right ventricular assist devices has recently become available. The early identification of patients in need for such support may improve their prognosis.
Methods: A total of 1929 adult patients underwent cardiac surgery at our institution from 2007 through 2009. Data on RV function and EuroSCORE parameters were obtained through chart review. Right ventricular failure was defined as a tricuspid annular plane systolic excursion (TAPSE) of ≤ 14 mm on echocardiography in patients with a complicated postoperative course.
Results: Right ventricular failure occurred in 90/1929 (4.7%) patients. In 1898 patients, EuroSCORE parameters were available for analysis. Independent predictors for the development of RV failure included age >75, extracardiac arteriopathy, left ventricular dysfunction, a critical preoperative state, creatinin level of >200 µmol, a recent myocardial infarction, other than isolated coronary artery bypass grafting and pulmonary hypertension. From these parameters, we constructed a simple risk score for the preoperative prediction of development of postcardiotomy RV failure. The area under the receiver-operating-characteristic curve was 0.81 (95% CI 0.77-0.86).
Conclusion: Postcardiotomy RV failure occurred in 4.7% of patients in a single-center cohort of patients undergoing cardiac surgery. We developed a simple risk score based on EuroSCORE-derived parameters to enable the preoperative identification of patients at low, medium and high risk for developing postcardiotomy RV failure.

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Complete Revascularization Improves Survival in Patients with STEMI Complicated by Cardiac Arrest and Cardiogenic Shock

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Background: Target-vessel (TV) percutaneous coronary intervention (PCI) is recommended for patients with multivessel (MV) coronary disease presenting with ST-segment elevation myocardial infarction (STEMI). However, guidelines suggest that complete revascularization may be beneficial if STEMI is complicated by cardiogenic shock. We sought to evaluate the role complete revascularization a high-risk STEMI population.
Methods: We prospectively recruited consecutive STEMI patients with RCA arrest and shock at 5 French tertiary referral centers. Cardiogenic shock was defined by a blood pressure persistently <100/70mmHg. Multivessel disease was defined as ≥1 coronary stenosis (≥50%), and successful PCI by the restoration of thrombosis in myocardial infarction (TIMI) III flow. The primary end-point was in-hospital mortality.
Results: In total, 162 patients (75.9% male) with a mean age of 59.9±13.7yrs were recruited between March 2004-June 2010. Ventricular fibrillation was the underlying arrhythmia in 66.1%, and the average time to defibrillation was 15.1±12.3 minutes. At coronary angiography, at least 1 obstructive coronary lesion was present in all patients, 87.0% were ventilated, and 40.3% required intra-aortic balloon pump insertion. PCI was deemed successful in 87.0%. In-hospital death occurred in 67.9% of cases. Multivessel CAD was present in 56.2% (91) of patients. Of these, 62.3% (57) underwent TV PCI only, and 37.7% (34) MV PCI. Patients undergoing MV PCI were younger (60.4±12.5vs66.5±11.2,p=0.044), however other baseline characteristics were similar between the groups. In the MV PCI cohort, on average 2.2±0.3 coronary arteries were treated. In-hospital mortality was significantly decreased in patients who had MV PCI compared to those who has TV PCI only (47.1%vs80.7%,p=0.01).
Conclusion: This is the first study to demonstrate that MV PCI may improve outcomes in patients presenting with STEMI, complicated by RCA and shock. Further prospective studies are required to confirm these results.

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Percutaneous Left Ventricular Support With the Impella 2.5 Assist Device in Severe Cardiogenic Shock

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Background: Cardiogenic shock (CS) following acute myocardial infarction (AMI) is associated with high in-hospital mortality rates and many patients succumb to persisting low cardiac output and multiple organ failure. Percutaneous left ventricular assist devices (pLVAD) provide circulatory support by replacing LV function to bridge potentially recoverable heart failure. The purpose of the Impella EUROSHOCK-registry was to evaluate the safety and efficacy of the Impella-2.5 (Abiomed Europe, Germany) in patients with severe CS after AMI in contemporary practice.
Methods: The registry retrospectively included 120 (mean age 63.6±12.2; male 81.7%) patients in CS with AMI from 14 institutions across Europe who received temporary circulatory support with the Impella-2.5-pLVAD. Data were collected by standardized case report forms. The primary outcome was overall mortality at 30 days, the secondary outcome was the change of plasma lactate levels and MACE. Multivariate logistic regression analysis was performed to identify independent predictors of outcome.
Results: Overall 30-day mortality was 64.2%. After placing an Impella 2.5, lactate levels decreased significantly from 5.8±5.0mmol/l to 4.7±5.4mmol/l at 24 hours and to 2.5±2.6mmol/l at 48 hours (p=0.003). Age>65 and plasma lactate levels upon hospital admission >3.8mmol/l were significant predictors of 30day-mortality. Long-term survival after a follow-up period of 317±526 days was 28.3%. Major cardiac and cerebral events were reported in 18 (15%) patients. Rates of bleeding requiring transfusion and/or surgery occurred in 34(28.6%), haemolysis in 9(7.5%) and pericardial tamponade in 2(1.7%) patients.
Conclusion: In AMI patients with CS, Impella 2.5-treatment is feasible and resulted in a reduction of lactate levels. Overall 30-day mortality was high, reflecting the last-resort character of Impella treatment and the selection of patients with a particularly poor hemodynamic profile and a greater imminent risk of death. Further studies and adequately powered controlled trials are necessary to investigate the efficacy of Impella 2.5 support in AMI patients with CS.